



#### VETERAN WEAPON

*This is the high voltage tube at California Institute of Technology which has been an unusually formidable weapon in the attack on the atom.*

rate as the positive electrons.

In the case of boron and deuterons the unstable nucleus formed after the ejection of a neutron would be carbon of mass eleven. Both positive electrons and photons or gamma rays have been observed in this case also. Lithium has been tried but gave feeble results. Moreover the half life is the same as for carbon so it is likely that a slight carbon impurity is responsible for the after effect. More experiments are in progress.

#### British Continue Experiment

Artificial radioactivity has been produced at Cavendish Laboratory in Cambridge by bombarding graphite with high velocity protons. This man-made radioactivity confirms and extends the work of the French scientists.

Drs. J. D. Cockcroft, C. W. Gilbert and E. T. S. Walton speeded the hydrogen nuclei or protons to a high velocity with the same 600,000 volt tube that has previously performed important atomic transmutations. Positrons or positive electrons were produced.

The new radioelement produced lost half its activity in ten minutes. The scientists believe that the radioactive element formed in nitrogen of mass 13 is created by the addition of a proton to the ordinary carbon mass 12 of the graphite. A report is published in *Nature*.

*Science News Letter, March 10, 1934*

#### PLANT PHYSIOLOGY

## Plants Retain Heavy Water In Formation of Tissues

**P**LANTS retain "heavy water" which they take out of the general water supply, and build it into their woody tissues and into the starches and other carbohydrate foods they form. Although it is present only in very minute proportions in the normal water of the soil and of rivers, the plants are in some way able to select it out, so that a larger ratio of it is present in the water bound up in wood and carbohydrate than is present in the "normal" free water which the plant takes in.

This selective action of plants on heavy water was found to be true for willows, in experiments performed at the National Bureau of Standards by the late Dr. Edward W. Washburn and his associate, Dr. Edgar R. Smith. Dr. Washburn, pioneer investigator of heavy water, which contains atoms of the recently discovered double-weight hydrogen, or deuterium, died suddenly on Feb. 6; the report by himself and Dr. Smith has been published posthumously in *Science*.

Dr. Washburn and Dr. Smith thought that plants might exercise a selective action on the minute amounts of heavy water that occur mixed with the general supply of normal water. They decided to test their scientific "hunch" by growing plants with their roots in water, and then analyzing the water bound up in their compounds for its fraction of heavy water.

At first they had hard luck. A big pot of cow peas was coming along nicely, when aphids got into the plants and killed them. Then they tried a pot of corn, only to have it killed by cold.

Finally they grew several cultures of rooted willow shoots, both in normal Potomac river water and in water with a high ratio of heavy water made in the laboratory. These experiments went through successfully.

In every case, they found that the selective action of the plants did not take place on the water as it was absorbed. The water left in the pot after the willows had been absorbing from it for a long time was unchanged in its weight.

But when they subjected the willow shoots to chemical analysis and tested the weight of the water distilled out

of their tissues, they found a different story. One fraction of the water, representing the sap, was uniformly 2.8 parts per million heavier than normal water, representing that ratio of excess of heavy water. A second fraction of the water, obtained by heating the willow tissues to destruction, was, on an average of three samples, 5.4 parts per million heavier than normal water.

The report of the two scientists does not undertake to decide whether this selectivity by the plant is beneficial, harmful or neutral in its effects. This, they state, can be determined only by further experiments. It is known, of course, from experiments by Dr. Washburn and other scientists, that in high concentrations heavy water is harmful to living plants and animals.

One outcome of the experiment is the suggestion that the natural plant products, oils, carbohydrates, etc., may be expected to contain an abnormal amount of heavy hydrogen, if all plants show the same selective action on heavy water that was discovered for willows.

*Science News Letter, March 10, 1934*

#### HISTORY

### Lost History Sought In Mosque of St. Sophia

**T**HE CHURCH of St. Sophia in Istanbul, which Turkey's modern ruler, Kemal Pasha, has generously opened to scientific inspection, may yield important facts about an empire which is a medieval mystery.

This is the hope of Prof. A. A. Vasiliev, of the University of Wisconsin history faculty, who is completing plans to sail for Istanbul. Research funds have been granted him to study St. Sophia's mosaics and manuscripts which are for the first time in 400 years being shown to western scholars. Since the fifteenth century, when the Turks captured Constantinople, the great church of the Roman Emperors of the East has been a Moslem mosque and a harbor for mystics and scholars of Moslem faith.

Now, American scholars cooperating with Turkish officials are removing the masks of plaster and paint that devout Moslems laid over the glittering, color-

ful mosaic pictures of Christian art in the church.

Prof. Vasiliev will examine the mosaics so far uncovered, and will search the manuscripts stored in old crypts and vaults of the building, for light on the little-known Empire of Trebizond. On the history of this Empire, Prof. Vasiliev is a leading authority, although Arabic and Byzantine manuscripts have yielded him only a smattering of information.

Exploring the riches of the St. Sophia documents, Prof. Vasiliev expects to use no less than a dozen languages in his effort to re-establish in history an almost forgotten empire.

*Science News Letter, March 10, 1934*

## METEOROLOGY

## Winter Tornadoes Rare But Causes Are "Orthodox"

**W**INTER tornadoes, such as the storms that took two score lives in the South on Sunday afternoon, Feb. 25, are unusual only in the season of their occurrence, scientists of the U. S. Weather Bureau told Science Service. The basic physical causes that bring tornadoes into existence are the same, whatever the season.

The state of great atmospheric instability that can start these intense twisting air-whirls is set up most commonly by the inflow of a cold air mass at a relatively high level—6,000 to 15,000 feet—riding over a mass of warm air that hugs the ground. Such an extensive "temperature inversion" is an invitation to the two air masses to mix and overturn—and if the overturning is rapid enough, swirls of tornadic force are the result.

*Science News Letter, March 10, 1934*

## ▼ R A D I O ▲ FOLLOWING DARWIN'S TRAIL IN SOUTH AMERICA

an address by

**Dr. W. H. Osgood**

Curator of Zoology, Field  
Museum of Natural History

Wednesday, March 14, at  
4:30 p. m., Eastern Stand-  
ard Time, over Stations of  
the Columbia Broadcasting  
System. Each week a promi-  
nent scientist speaks over  
the Columbia System under  
the auspices of Science  
Service.

## PHYSIOLOGY

# Baby Rabbits Born Normally After Fertilizing in Glass

## Harvard Physiologists Succeed with "Ectofertilization" And Development of Ova by Foster Mother

**B**ABY RABBITS, developed from eggs that were fertilized outside the mother's body and brought to birth in the body of a second mother rabbit, have been produced in the Harvard University laboratory of general physiology by Prof. Gregory Pincus and E. V. Enzmann. These little rabbits, "fathered" in a glass flask by sperm extracted from a male rabbit, may be looked upon as the first actual approach to "ectogenesis," or "babies born in a bottle," about which scientists with a romantic bent, like J. B. S. Haldane, have been dreaming for years—though it is admittedly still a long way from realization for human beings.

Each of the two litters of "ectofertilized" rabbits which Prof. Pincus and Mr. Enzmann have succeeded in obtaining may in a sense be said to have had three fathers and two mothers, for in each case three male and two female rabbits were required for the process. In the strict biological sense, of course, the real mothers were the females that supplied the ova and the real fathers were the males that supplied the sperm; the others would rate more as auxiliary or foster parents.

To produce their "ectofertilized" rabbits, the Harvard scientists first mated a female rabbit with a male which had been rendered incapable of producing sex cells by a simple surgical operation. The mating act stimulated the first steps in the development of the ova, or female sex cells, which however, still remained unfertilized.

Then the ova were removed from the mother rabbit's body and placed in a suitable fluid in a glass vessel. Sperm from a normal male rabbit was added, and allowed to remain with the ova until each one had received the fertilizing male cell. Certain changes observable under the microscope indicated to the watchers that this process had taken place.

In the meantime, the "foster-mother" rabbit had been prepared for her role by being mated with another male in-

capable of producing functional sex cells. Into her maternal tissues, thus stimulated to activity, the ova of the other rabbit, fertilized in a glass vessel with the sperm of a male she had never seen, were introduced. They developed, and in due time the young rabbits were brought forth.

In order to have a check on the correctness of their technique and to make sure that the second mother rabbit's own ova were not chance-fertilized by stray sperm-cells, rabbits of different breeds were used throughout, so that the coat color of the young ones would indicate their actual parentage. This was in both cases indubitably traceable to the ova and sperm cells in the glass vessel.

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## ANTHROPOLOGY

## South Sea Wood May Reveal Life of Ancients

**A** NEW way of tracing the origin and early activities of Polynesian peoples is to be tried by Yale scientists.

The new attack on the problem will be an investigation of over 2,500 wood specimens from remote islands of the South Seas. By studying these samples of wood, and comparing them with old wooden implements used by Polynesians, the Yale School of Forestry hopes to learn more about where the islanders came from, and with what regions they had contact.

The collection of South Sea woods has been given to the School of Forestry by the Bernice P. Bishop Museum of Honolulu, and is intended for use in the systematic study of woods of the entire world now being sponsored by Yale in cooperation with the International Association of Wood Anatomists.

The Bishop Museum specimens are pronounced of exceptional value because nearly all were obtained by scientists on expeditions to remote localities in the Pacific.

*Science News Letter, March 10, 1934*